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ABSTRACT

The correlations between four childhood factors (externalizing, internalizing, asocial, and IQ/school achievement) and adult outcome ratings were investigated with 45 males with a young adult onset of schizophrenia who had been followed into middle age and for whom childhood information was available from a child guidance clinic. Among findings were that low IQ-poor social achievement and asocial childhood factor scores were significantly related to unfavorable adult outcome and externalizing factor scores were significantly related to favorable adult outcome while internalizing factor scores were unrelated to outcome. Methodology for obtaining the factor analysis is discussed and charts showing statistical results are provided. (SBH)

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THE LONG-TERM PROGNOSTIC SIGNIFICANCE OF INTELLIGENCE AND AGGRESSIVENESS IN CHILDREN

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Literature reviews of empirical efforts to classify childhood disorders have reported a set of broad-band or second order factors (Achenbach & Edelbrock, 1978; Quay, 1979). The four broad-band or second order factors that have emerged most consistently are presented in Table 1. The first of these, externalizing, appears particularly robust having been reported across a wide range of samples, checklists, and investigators. The second factor, internalizing, has included a common set of items but items from the asocial factor have also been included in some studies (Quay, 1979). The asocial dimension has emerged as a separate factor most frequently in samples with more disturbed children. It seems desirable to adequately measure this dimension and maintain it separately from the internalizing dimension. The IQ-school achievement dimension while missing in some studies does emerge given appropriate checklist coverage. This point has been addressed in a study using different symptom checklists on the same sample (Lessing & Zagorin, 1971). Evidence suggests that these four broad-band factors tend to be relatively independent. Clearly, the broad-band factors can be related to more specific, narrow-band factors (Miller, 1967).

The sample to be discussed, although a somewhat atypical sample of preschizophrenics, did produce four orthogonal factors, similar to those found in more representative samples as shown in Table 1. For details about the sample, factor item composition, and data analysis procedures see Roff, Knight, & Wertheim (1976). In general, the sample consisted of male subjects with a young adult onset of schizophrenia who have been followed into middle age and for whom childhood information was available from child guidance clinic records.

The transition from dimensions to types has presented problems. Given

a situation where factor scores were available for the four second order childhood dimensions and an adequate adult outcome criterion had been obtained, different methods of typing or classification could be compared. The emphasis has been placed on predictive validity as the primary evaluative criterion (Blashfield & Draguns, 1976). Although the sample size is small (N=45), it is not uncommon that an investigator desires to classify cases in a sample of this size.

Initially, various clustering techniques were compared: linear typal analysis (LTA), cluster analysis of a D^2 matrix, and hierarchical grouping analysis (for specific computer programs see Overall & Klett, 1972; Veldman, 1967). The absence of complete satisfaction with the results of these analyses led to a more simplified approach as an additional comparison. Our goal was to discover the relationships present in this particular sample with an emphasis on prediction of adult outcome from childhood information and to convey these findings in a straightforward manner that might facilitate replication. The method selected involved taking each possible pair of dimensions, performing a median split on each variable, and as a result producing six 2 X 2 tables. For each 2 X 2 table, the mean adult outcome rating was computed for each cell along with the proportion of cases with unfavorable adult outcomes. Particular interest was directed toward combinations of childhood dimensions that isolated subgroups or cells with distinctive long-term outcomes. By this means a crude system of classification was possible for comparison with the results of cluster analysis.

RESULTS

Table 2 provides the correlations between the childhood factor scores and the adult outcome ratings. Low IQ-poor school achievement and asocial

childhood factor scores were significantly related to unfavorable adult outcome. Externalizing factor scores were significantly related to favorable adult outcome while internalizing factor scores were unrelated to outcome. This set of relationships for the four factors suggests what might be expected from the classification efforts.

Considering externalizing and internalizing symptom dimensions together, with both dichotomized, Table 3 provides the mean outcome rating, percent with unfavorable outcome, and number of cases in each cell. Although a two-way analysis of variance produced a significant main effect for externalizing, the cell of interest, associated with unfavorable outcome, had low scores on both externalizing and internalizing. The other three cells were not significantly different. This result suggests that contentions about the relative prognostic significance of externalizing as compared to internalizing symptoms in preschizophrenics may be misleading. The possibility that other symptom dimensions may be more predictive must be considered.

To assess this possibility, Table 4 evaluates the effect of the IQ-school achievement and asocial dimensions in combination. Cells significantly related to favorable and unfavorable adult outcome did emerge. High scores on the asocial dimension and low IQ-poor school achievement in combination were related to unfavorable outcome while the group with scores in the favorable direction on both dimensions had significantly more favorable long-term outcomes. The groups with unfavorable scores on only one of the two dimensions had similar intermediate outcomes.

Externalizing and IQ-school achievement revealed a subgroup with poor outcome (Table 5). Among preschizophrenics with low IQ-poor school achievement those with below average externalizing scores had strikingly less

favorable outcomes. Below average IQ as a predictor was modified by the level of externalizing symptoms. The remaining three cells were not significantly different.

As Table 6 shows this same moderating effect was not found for internalizing symptoms. A main effect for IQ-school achievement accurately reflected cell differences.

Tables 7 and 8 demonstrate the effect of the asocial dimension on the externalizing and internalizing dimensions. The tables suggest that any comparison of externalizers and internalizers should take the asocial dimension into account. The main effect of the asocial dimension was clearly the dominant influence.

Given these relationships, for comparison, a linear typal analysis was performed yielding four types as shown in Figures 1-4. For a sample of this size, LTA will generate as many types as dimensions for up to six dimensions or variables. LTA did nore clearly isolate an externalizing type related to favorable adult outcome than the 2 X 2 tables. A second clustering technique, cluster analysis of a D^2 matrix, defined the third profile in a manner that improved its predictive value (Figure 3). This calls attention to the choice of a similarity index in that LTA's covariation measure matches profiles for shape but not elevation. The third pure profile type (LTA) clustered cases with considerable variation in elevation on the important asocial dimension. The D^2 measure of similarity in considering elevation is probably closer to clinical judgements of similarity in this instance.

DISCUSSION

The results of the clustering techniques and the 2 X 2 tables when taken

together indicate the following groups within the sample:

An externalizing type related to favorable adult outcome with the asocial dimension related to prognosis within the type.

A low IQ-poor school achievement type related to unfavorable outcome with the externalizing dimension related to prognosis within the type.

An asocial type related to unfavorable outcome with the IQ-school achievement dimension related to prognosis within the type.

An internalizing type with IQ-school achievement dimension determining its relation to outcome.

One of the functions of the 2 X 2 analyses was to indicate in what ways changing the shpae of a particular profile would change its relationship to the outcome variable. For example, in one clustering method (clustering of a D^2 matrix) the type defined by the IQ-school achievement dimension emerged with a more elevated externalizing score and the type became neutral with respect to outcome. The 2 X 2 tables suggested relationships between aggressiveness as measured by the externalizing factor and intelligence as measured by the IQ-school achievement factor that were not as evident from the types produced by the various clustering techniques. The combination of low IQ-poor school achievement and below average externalizing scores produced the group with the highest proportion of unfavorable outcomes. Approximately one-half of this group had above average scores on the asocial dimension but the other half did not. What emerged from a further analysis of the 2 X 2 tables was a subset (N=5) of cases that had low IQ-poor school achievement with below average scores on the remaining three dimensions and all of these cases had unfavorable outcomes.

The reduction of primary dimensions to the first two factors, externalizing

and internalizing, would eliminate the two dimensions that for this sample possessed the most important prognostic information, (Kohn & Rosman, 1973; Peterson, 1961). It is not likely that the addition of further dimensions beyond the four presented, such as socialized delinquency, would have improved prediction.

One immediate need is for standard measures of the four dimensions that can allow comparisons across samples. It appears less likely that a standard set of profiles will become as well established. In view of the probable reluctance to match the shape of a particular set of profiles from another study, the 2 X 2 tables provide an alternative, given similar factors, that might facilitate replication. Given an appropriate sample, we would be more interested in efforts to replicate the suggested relationships presented than in attempts to match a somewhat unstable set of profile types.

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Table 1

BROAD-BAND FACTORS

ACHENBACH & EDELBROCK (1978)	ROFF, KNIGHT & WERTHEIM (1976)	PETERSON (1961), QUAY & QUAY (1965)	REFERENCE LABEL
UNDERCONTROLLED	UNSOCIALIZED AGGRESSIVENESS	CONDUCT PROBLEM	EXTERNALIZING
OVERCONTROLLED	NEUROTICISM	PERSONALITY PROBLEM	INTERNALIZING
PATHOLOGICAL DETACHMENT	SCHIZOID SYNDROME	INADEQUACY-IMMATURITY	ASOCIAL
LEARNING PROBLEMS	LOW IQ - POOR SCHOOL ACHIEVEMENT	_____	IQ-SCHOOL ACHIEVEMENT

Table 2

CORRELATIONS WITH ADULTS OUTCOME RATINGS

CHILDHOOD FACTORS	R
EXTERNALIZING	-.33*
INTERNALIZING	.04
ASOCIAL	.36*
IQ - SCHOOL ACHIEVEMENT	.33*

*p < .05, N=45

Table 3

	EXTERNALIZING		
INTERNALIZING	LO	HI	
LO	4.6	3.0	MEAN OUTCOME RATING
	90%	33%	% UNFAVORABLE OUTCOME
	10	12	N
HI	3.4	3.1	
	50%	36%	
	12	11	

ANOVA: EXTERNALIZING $p < .05$

MEAN OUTCOME RATING FOR TOTAL SAMPLE = 3.5

% UNFAVORABLE OUTCOME FOR TOTAL SAMPLE = 54%

Table 4

ASOCIAL

IQ - SCHOOL ACHIEVEMENT	LO	HI
LO	3.6	4.5
	58%	82%
	12	11
HI	2.4	3.6
	17%	50%
	12	10

ANOVA: ASOCIAL p = .01

IQ - SCHOOL ACHIEVEMENT p = .01

MEAN IQ FOR TOTAL SAMPLE = 94.0

Table 5

EXTERNALIZING

IQ - SCHOOL ACHIEVEMENT	LO	HI
LO	4.6 92% 13	3.2 40% 10
HI	3.0 33% 9	2.9 31% 13

ANOVA: IQ - SCHOOL ACHIEVEMENT $p < .05$

EXTERNALIZING $p = .06$

INTERACTION $p = .10$

Table 6

	INTERNALIZING	
IQ - SCHOOL ACHIEVEMENT	LO	HI
LO	4.1	3.9
	71%	67%
	14	9
HI	3.1	2.9
	38%	29%
	8	14

ANOVA: IQ - SCHOOL ACHIEVEMENT $p < .05$

Table 7

ASOCIAL

EXTERNALIZING	LO	HI
LO	3.5	4.5
	56%	82%
	11	11
HI	2.6	3.6
	23%	50%
	13	10

ANOVA: ASOCIAL $p < .05$
EXTERNALIZING $p < .05$

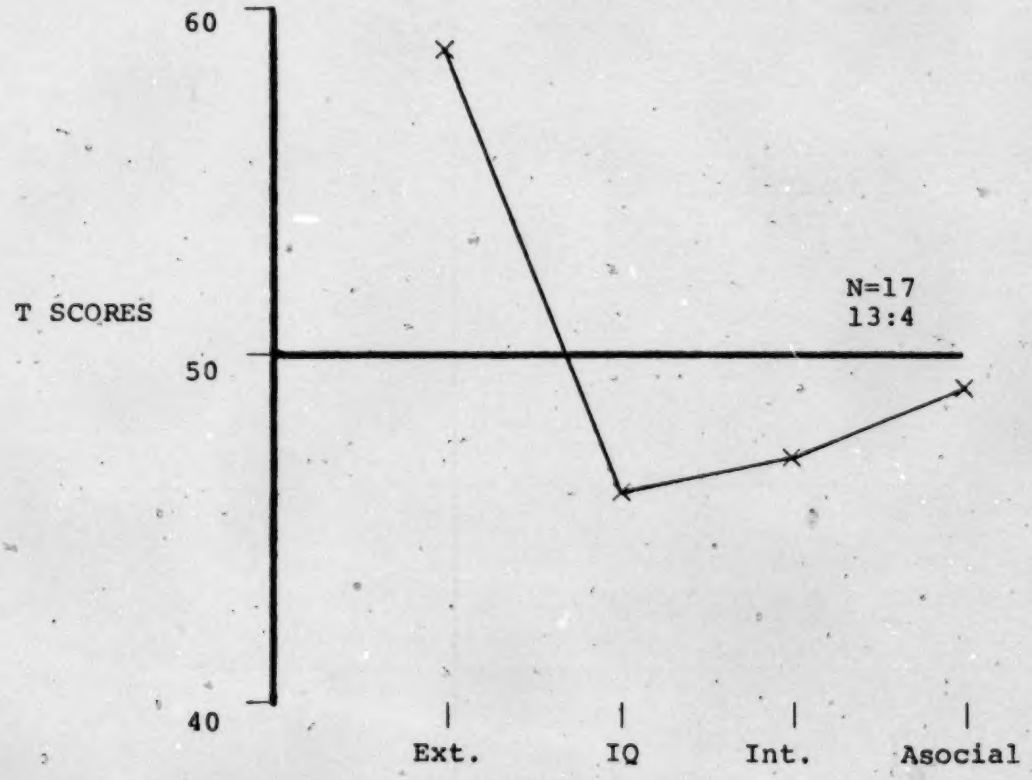
Table 8

ASOCIAL

INTERNALIZING	LO	HI
LO	3.3	4.3
	50%	70%
	12	10
HI	2.8	3.8
	25%	64%
	12	11

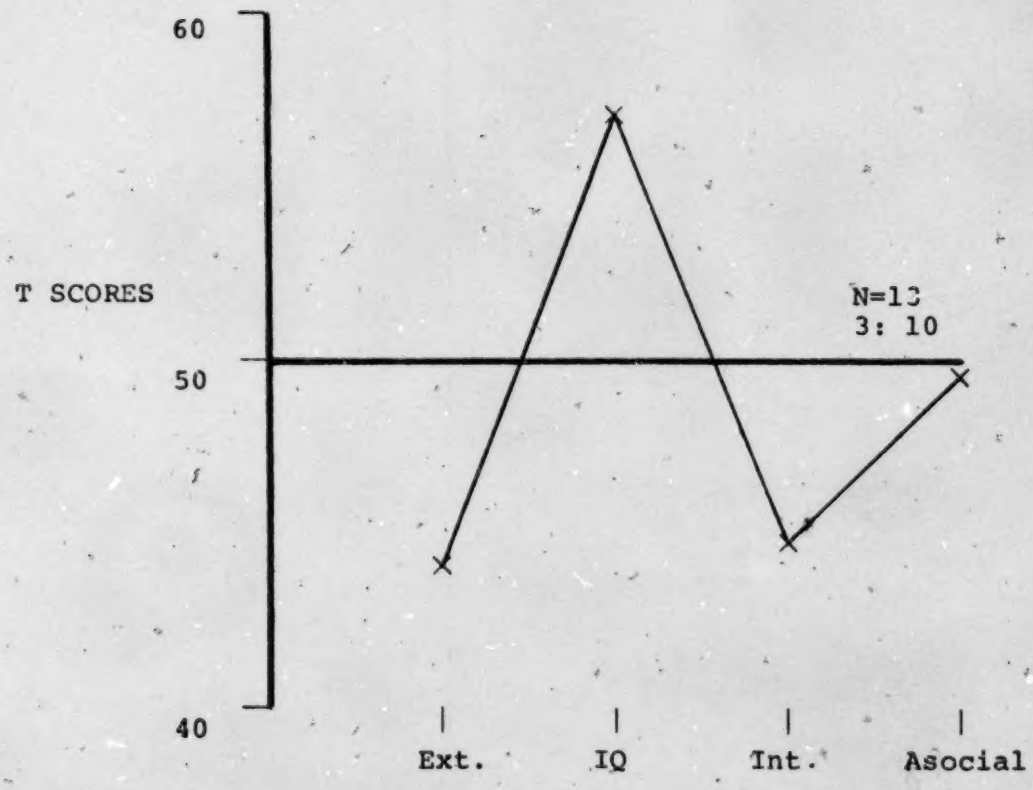
ANOVA: ASOCIAL $p = .01$

LINEAR TYPAL ANALYSIS



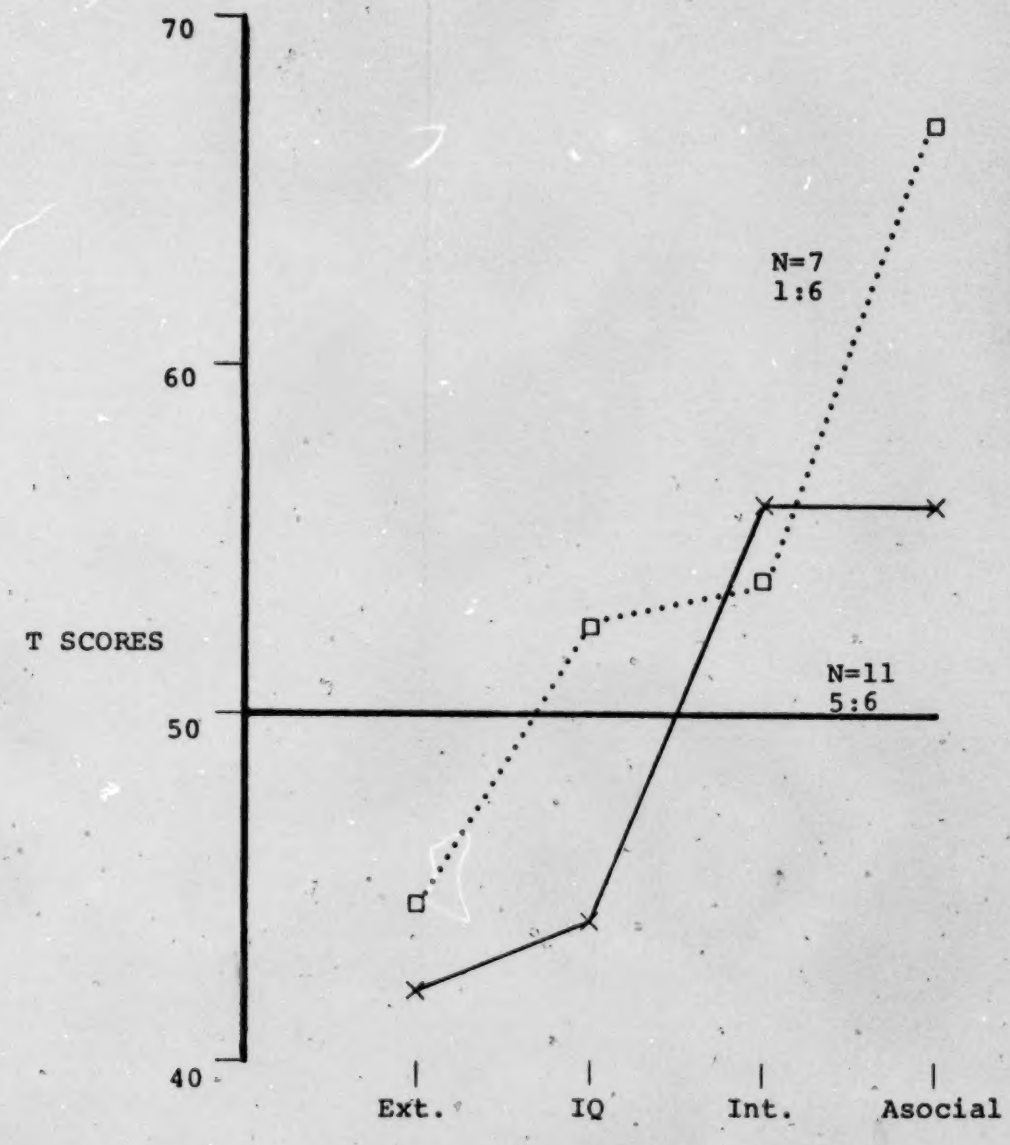
PURE TYPE PROFILE 1

Figure 1



PURE TYPE PROFILE 2

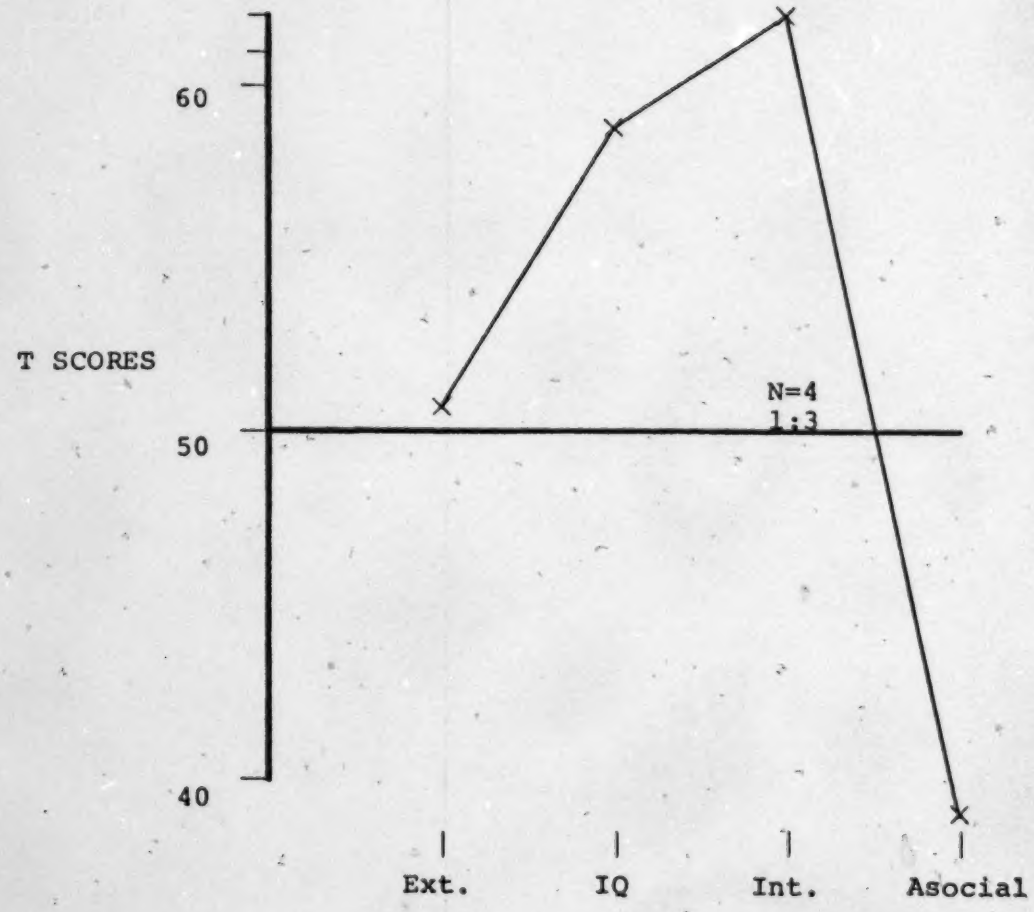
Figure 2



PURE TYPE PROFILE 3 ———

CLUSTER ANALYSIS D^2 MATRIX .....

Figure 3



PURE TYPE PROFILE 4

Figure 4